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ABSTRACT

This descriptive study examines how the proliferation of electronic hook-ups to remote locations, to databases, and particularly to electronic mail (e-mail), is changing the work, communication patterns and self-image of higher education faculty. In particular the study examined whether technological acquisition had an impact on professors' perceptions of their "invisible colleges", and whether or not there were systematic differences between men and women in their constructions of these changes in their worklife. Explored are "invisible colleges," scientific communities whose members do not live and work in close proximity; human-machine interaction; and literature on gender differences in computer skill acquisition processes and psychological approaches to exploration of computer logic. In-depth open-ended interviews were conducted with six new electronic mail users. Additional data were derived from one network's ongoing conversations regarding the nature of "community." Results indicated that users conversing regularly on networks were forming "communities" with self-conscious discussion of "courtesy" and fair intellectual exchange; that e-mail has made communication between scholars more democratic and broader particularly for women; that style of conversation is informal and humorous; and that mastering the technology had different effects on men's and women's self-image. (Contains 23 references.) (JB)

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VIRTUAL COMMUNITY AND INVISIBLE COLLEGES: ALTERATIONS IN FACULTY SCHOLARLY NETWORKS AND PROFESSIONAL SELF-IMAGE

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ASSOCIATION FOR THE STUDY OF HIGHER EDUCATION

This paper was presented at the annual meeting of the Association for the Study of Higher Education held at the Marriott City Center, Minneapolis, Minnesota, October 29 - November 1, 1992. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

VIRTUAL COMMUNITY AND INVISIBLE COLLEGES

Introduction

Marshall McLuhan's "global village" has become an virtual, if not a concrete, reality. Scholars are beginning to explore the meanings of the "electronic cottage", often at home from their own electronic cottages, hooked up to a variety of databases, journals, and library resources. The world has become so small that at least two independent anthropology texts (Van Maanen, 1988; Marcus and Fischer, 1986) suggest that cultural studies and ethnographies may prompt televised appearances from the "subjects" of the study, objecting to the ethnographer's "findings", representations, and text. The media in general, and electronic communication in particular, are pervasive, and their influences only beginning to be charted. The full impact of the computer revolution will likely not be understood for some years to come, although clearly scholars are at work on the central problems. The what, when , where, who, how, why, and under what circumstances that computers have entered daily home and work life is a mystery to be solved in the future. For the purposes of this paper, however, two of the most profound impacts have been visited on the professoriate. The first is in the form of word processing, which has largely obviated the necessity of re-typing multiple manuscripts for editorial corrections and emendations, and with this has come the possibility of preparing major scholarly publications without the aid of secretarial help at all.

The second major change is the focus of this paper. That change involves the electronic connection ("hookups") to remote teaching stations, library and database services, and, more importantly, electronic mail, generally throughout the world. The second kinds of changes have been little explored, particularly with respect to their ability to alter the professoriate's work habits, communication patterns, invisible scholarly networks, and self-images.

Problem

The appearance of personal computers on faculty desks has created a revolution in the way the professoriate (or some subset of it) works. The subsequent addition, on many campuses, of online access to the campus library catalog, journal and other print media databases, and the latter addition of electronic mail has altered both work and scholarly communication patterns. The speed, efficiency, and low cost of electronic communications have meant that campuses tied to tight budgets have strongly encouraged electronic communication over long-distance phone charges, FAX over express mail charges, and computer communication over expensive clerical services to prepare mail.

As a result, electronic (or e-) mail in particular may be subtly reversing the manner in which faculty relate to each other: the individuals with whom they relate on a regular basis; the relative ability of communicating with far-flung colleagues cheaply and efficiently; and possibly the form or substance of any given communication. In addition, mastering this expanding technology appears to be altering the way some members of the professoriate see themselves personally and professionally. While new young faculty may arrive on campus with e-mail and database access technology in hand, older, post-tenure faculty may have to acquire it late in life. This later acquisition creates fresh images of the self in some individuals, and prompts some to re-think their roles and abilities.

Objectives of the Study. Because I entertained a hypothesis that some or many faculty might be undergoing the same kinds of learning experiences and technology acquisition that I had experienced, and because I could find little in the literature to document whether my experiences were unique or common, I set out to discover whether new bitnet users underwent changes in self-images as they mastered desktop database technology and simultaneously began to reach out nationally and internationally on e-mail; whether this technological acquisition had any impact on their perceptions of their "invisible colleges"; and whether or not there are systematic differences between men and women in their constructions of these changes in their worklife, or their attitudes towards their worklives.

The work itself was always projected to be largely descriptive. Since no adequate theories yet exist to structure our thinking about computers and their effects on our lives, any research in this area is necessarily preliminary and conjectural. Accordingly, the study is aimed not at generalization, which would be perilous, useless, and premature, but rather at description. And even the description provided is provisional and preliminary. Many more cases would need to be gathered and explored before one could make statements about groups. Its purpose is as much to begin to describe the questions we might wish to explore as to provide a slice of the e-mail user's realities.

Pieces of Several Relevant Literatures.

Theories of cybernetics (human-machine interaction), theories of human-computer interaction (Turkle, 1984; Brod, 1984; Sproull and Kiesler, 1991), theories of the self, and theories about academic worklife (Crane, 1972; Price, 1961; Cronin, 1982) and scholarly communities (Cronin, 1982; VanMaanen, 1988) are not integrated at this time. Nevertheless, this particular study was informed by three descriptive/theoretical frameworks. The choice of these frameworks was guided largely by an intuitive search for literature which could and would inform the act of listening to new bitnet users as they wrapped words around their highly personal experiences reaching through a keyboard and monitor to "touch" other colleagues.

The framework of invisible colleges

The first descriptive framework was that of "invisible colleges". Invisible colleges, or scientific communities whose members do not live and work in close proximity to one another, is a concept pioneered by Price (1961) in his work on the diffusion of scientific knowledge, and by Thomas Kuhn in his work on the structure of scientific revolutions, brought into common parlance in the higher education literature by Crane (1972), and elaborated upon by several historians and sociologists of knowledge (Ben-David, 1960, 1964; Holton, 1962; Storer, 1966; Toulmin, 1963). Scarcely a decade ago, invisible colleges were formed by mutual problem definition and exploration, a process enhanced by the presentation of research papers, exchanges of scholarly correspondence (including paper critiques between colleagues and journal reviews),

and phone calls between researchers of similar interests. Scholarly conferences, print media, and the long- distance call, supplemented by the late night, quiet drinks between colleagues at annual meetings, comprised the communication nexus of invisible colleges. By far the most important of these communication venues was the scholarly paper, exchanged as a result of the annual meeting, in journals, or, more importantly, between colleagues who were trusted to read and provide useful criticism to one's own work.

Scholars of higher education are most familiar with the work of Crane simply because her interests, as a sociologist of science, were with the way in which particular kinds of communities -- in her case, communities of individuals involved in the social organization of knowledge production and diffusion -- stimulated the growth and diffusion of scientific knowledge via utilizing and exploiting intellectual innovations around a nexus of one or more highly productive scholars (1972, pp. 1-5). Crane's work is focussed around the revolutionary aspects of disciplines, especially the way in which communities define and begin to explore particular questions which they have, among themselves, defined. It would be a reasonable extension, however, to re-cast Crane's research as facilitated and/or mediated by a technical innovation since the theory of invisible colleges is predicated on contacts with highly productive scholars. Electronic networks would be likewise..., likewise organized to take up disciplinary questions of central concern to disciplines and subdisciplines. And this is precisely what has occurred in the move toward electronic networks dedicated to particular discussions and dramatic events in disciplines. So, for instance, networks exist on qualitative research, virtual communities, feminism and women's issues, cultural studies, and hundreds of other disciplines and subdisciplines.

In extending Crane's work this way, we can both simultaneously complicate matters to desperation's door, and at the same time understand how a technical innovation such as e-mail creates a multi-layered context for considering what is meant by an invisible college. In different language, I can consider the question of what constitutes an invisible college within an academic scholarly community, and simultaneously frame the invisible college as the group of

bitnet users who now have additional means of access to one another. Or to put it still a third way, invisible colleges allow me to consider disciplinary innovation, but at the same time, the concept permits some consideration of the means by which disciplinary innovation is communicated, discussed, shaped and re-shaped.

The context of professional work is in the process of being drastically reconfigured by the appearance of "virtual communities". Unlike invisible colleges, which develop over time, and which may have a half-life of nearly 30 years, electronic communities can arise instantaneously (in an afternoon) and disappear as swiftly. One respondent spoke of having the inter-campus e-mail network "go critical" -- a reference to working with radioactive materials and nuclear weapons -- or "flame out" when a topic taken up by the Faculty Senate turned into an firestorm of faculty and administrator opinion, all expressed within several hours of the original Senate meeting.

"Virtual community" itself is a bizarre metaphor created from physics and its study of virtual particles -- particles which possess only a temporary reality, usually within an accelerator or a cloud clamber -- and anthropological, sociological and cultural definitions of community -- individuals and groups bound by contexts and common cores of values sharing "place", space and time. Thus, as a metaphor, "virtual community" is itself a disturbing juxtaposition of meanings and referents, unique to the technological discourse which spawned it. Virtual communities (in academe) consist of highly specialized researchers who share common interests, but who may never have met each other face-to-face or who never plan to meet, and who are connected only by e-mail, electronic journals, electronic conferences, bulletin board networks, and special intellectual interests which may unite them either in a core manner (as in invisible colleges, around a disciplinary problem), or in a more peripheral sense (as an interest, for example, in a particular methodology, e.g., qualitative research, discourse analysis, or feminist studies). Crane's work, published twenty years ago, cannot have taken account of electronic mail, but it nevertheless provides a useful anchor for considering how academics organize their intellective processes and disciplinary lives in knowledge-producing communities.

The cybernetic impact framework

A second descriptive/theoretical framework is furnished by the burgeoning literature on cybernetic (human-machine) interaction, particularly on its effects on the human psyche, and images of the self and society, more specifically, what it means to "think" and to be human (Turkle, 1984). Not all of the literature is equally laudatory. Several authors and commentators have taken up the question of what the psychological, social, human and organizational costs might be on our social fabric (Brod, 1984; Moyal, 1992; Rakow, 1988) or on our ways of thinking and being in organizations (Bailey, 1991; Frissen, 1992). Bailey, for instance, in the SCUP E-mail Newsletter, points out that experts who utilize e-mail may "get great benefits from its use [although benefits are unspecified]", but that both personal and organizational detractions exist. Among the problems she cites with
e-mail are that

1. some studies point to undesirable effects on group decision making;
2. organization communication will become less inter-personal;
3. contemporary information technology interferes with the ability of make sense of events within the organization;
4. opportunities for face-to-face communication will be diminished;
5. more informal messages and "short-circuiting" of the hierarchy will occur;
6. messages of affect and values will decrease;
7. trust will play a changed role;
8. organizations may be less tolerant of people who do not think in a linear mode; and
9. expectations for work performance may be machine driven (Bailey, 1991).

Clearly, some of the ascribed "detractions" can be (and have been) challenged. Nevertheless, the elements of truth in the nine possible detriments represent potentials which might make electronic mail and communications unattractive to some, and undesirable to others, depending on the purposes which users and non-users see as possibilities.

Larger questions of the "self" and "community" arise in the context of emerging information and communication technologies. Turkle (1984) spent several years at studying "hackers" and other computer-literate individuals in various disciplines at MIT. Among some of her more unnerving findings, she watched how adolescents with access to computers used the machines to help to create a sense of identity (at an age when all reflection is self-referring), to exert control over some universe, to both discover and shape the answers to the question "Who am I?", and occasionally, to experience success where previously, adolescents felt they had experienced little.

Adults, Turkle argued, are not like adolescents when confronting technologies like the personal computer. They

> ...are more settled. In the worst of cases, they are locked into roles, afraid of the new, and protective of the familiar. Even when they are open to change, established ways on thiking act as a braking force on the continual questioning so characteristic of children....But there are events and objects that cause the taken-for-granted to be wrestled with anew. The computer is one of these provocations to reflection. Among a wide range of adults, getting involved with computers opens up long-closed questions. (1984, p. 165, emphases added)

Among those long-closed questions were questions about politics, particularly personal politics centered around "knowledge cooperatives" (Ibid., p. 172), electronic bulletin boards, and communities. The advent of the personal computer brought forth a computer politics where computers "began to acquire an image as instruments for decentralization, community, and personal autonomy" (p. 172). It is this same sense of not being location bound, of existing in a community (however that may be being redefined), and exerting personal autonomy (via defining where and when and under what circumstances and with whom one interacts in the virtual community, and by mastering the technology) which has moved beyond the acquisition and use of a personal computer and is reflected in interviews I conducted on the use of e-mail technology by some users today.

The translation from the benefits of the personal computer for home use, however, and electronic mail capabilities is not a straight line, nor is it unproblematic. Technologies come

with costs, whether psychological, social, or human. The personal automobile brought enormous mobility to individuals and families, but in the process of making the suburbs possible, virtually destroyed downtown areas as communal and civic gathering places, shattered and fragmented the city as a residential environment, eventually ate up valuable farm land for roads, highways and developments, and created the shopping malls which litter the countryside. So, too, the computer has created costs of its own, only some of which are beginning to be understood at this time. The costs to our social fabric (Brod, 1984) -- to ourselves as an interweave of individuals in a civic and political polity -- are particularly fuzzy at the moment. We might well ask what the struggle to reinvent the concept of "community" means when some members substitute ephemeral communication for face-to-face (F2F) interaction, and flickering messages for action. The contradiction between rational and linear/mechanical metaphors for life, and postmodern social and political-economy critiques of modernist metaphors, pave the way for profound "technostress". Meanwhile, society in general and the professoriate (and other knowledge producers) in particular grapple with changing social and self-images, propelled by a technology with unknown ramifications which appears to be "quicken[ing the] pace of academic exchange and collaboration" (Wilson, 1992,A17), perhaps reinventing the way in which scholars work individually and in groups.

The gender and technology framework

A third descriptive/theoretical framework is provided by a small but important literature on gender differences in computer skill acquisition processes, and psychological approaches to exploration of computer logics (Turkle and Papert, 1990), and in the social construction of gender on electronic networks (where the actual gender of a communicator may be unknown and indecipherable [Palazzolo, in progress]). This beginning set of studies is linked further to an emerging literature (Kramarae, 1988; Rothschild, 1983; Sparks and van Zoonen, 1992) which considers the problems of gender and technology in an information age, specifically whether or not emerging technologies create new power relations, or reinforce old existing structures believed to be patriarchal. The literature expands in many directions, but some of the most

fruitful avenues appear to be the studies of community (Bregenze, in progress) and academic community (of which this paper is a beginning).

Turkle and Papert (1990) found, in studying young children with access to computers in learning environments (kindergartens and elementary schools) that there were distinct ways in which boys versus girls engaged computer skill acquisition processes. Further, in talking with the children regarding how they "constructed" their computer explorations, she found specific gender differences in psychological approaches to the exploration of underlying, programmatic computer logics. As a result, she suggests that girls may see computers differently from boys, and that this may make some difference in the extent to which we try to structure extremely open and loose exploratory environments for children beginning to interact with computers. This set of findings is important, because it is reflected to some extent in the experiences of adult females and males in acquiring computer use skills themselves.

Among the more heuristically interesting preliminary findings are those which direct our attention specifically to: whether women and men acquire electronic technology skills differently (Turkle, 1984, 1988); whether women conceptualize computer logics differently (Turkle and Papert, 1990); whether women and men relate to electronic communication with great variance in psychological affect (Turkle and Papert, 1990; Palazzolo, in progress; Rothschild, 1983; Benston, 1988); and whether or not it is significant that men and women acquire "styles" and "voice" (in the anthropological sense) and "voices" which in a sense create or recreate identity over electronic networks (Turkle and Papert, op. cit.; Rakow, 1988; McKay, 1988). All of those issues surfaced to a greater or lesser extent in this study, and are critical and interactive to some extent with the larger theme of this research, that is, whether or not there can be discerned changes in the invisible colleges (scholarly networks) of academics as a result of rapidly expanding computer networks.

Methods

In-depth open-ended interviews were conducted with six new BITNET users, utilizing in half the cases, two different models for each: face-to-face interviews (with all respondents), and

follow-up bitnet questions (with three). Interviewees, who represented primarily new (within the last 12-18 months) bitnet users responded to questions regarding: a) the use to which they put e-mail, and the relative frequency of their use; b) the extent to which they utilized on-line data services, including access to the campus library catalogue; c) their own learning patterns (self-taught, tutored, or university-sponsored classes); d) differences in modes and substances of communications; e) any alterations they may have noticed in who could now be considered members of their invisible colleges; f) personal versus professional uses to which they put e-mail : and g) changes in their feelings about themselves as they mastered the new technology (self-image). Additional data were derived from one network's ongoing conversations regarding the nature of "community".

All data were subjected to a formal content analysis (Krippendorf, 1980). First, units of data were separated by coding onto 3 x 5 cards, then the cards themselves (coded by rank and gender) were categorized into themes and categories of responses. Several, but not all, of the categories formed the basis of this paper (this research is part of a larger projected piece of research, exploring avenues which were not covered by the original proposal).

The author's role. I entered into this project because of my own experiences with e-mail and with a set of technologies suddenly available to me when I changed institutions. At a previous position, I had had no access to e-mail, to computerized access to the campus libraries, or to larger data base services (such as access to the Library of Congress holdings). When I arrived at a new position, I found a computer in my office (something to which I had not had access previously), a bitnet account number, a modem, and a colleague who found it rather fun (at least at first) to introduce me to the bitnet system. When I became too much of a pest, I was hard-wired into the main system, and gently told to work out my own technical problems with the bitnet Helpline crew, a crew with which I am now on a first-name basis, much to my amusement.

Some months after I had acquired some proficiency with the VM system, and a new Rolodex with nothing but bitnet access codes on it, I began to reflect about what this meant to

me. At roughly the same time, I began conducting major daily work of a scholarly nature on the network. I had become involved in the editing of a large Handbook, and the co-editor and I had acquired bitnet capabilities at the same time, along with our publishing house editor. Together, via e-mail, we have conducted over 50% of the work on the handbook, and remain in virtually daily contact with each other via this technology.

I felt powerful, efficient, more "connected" to my scholarly colleagues than ever in my career, and began to wonder whether others might share those feelings. I felt that my "learning curve" had gone up exponentially within a few short months, and that I was somehow, in some way which I could not wrap words around, changing. As I talked about this experience with others who were bitnet users, I found echoes of my own feelings, although more strongly among those who had not had extensive experience with anything but word processing technology -- my own experience. I read everything I could get my hands on about technology and the professoriate (slim pickings), about technology and women (slightly thicker literature, but uneven in its quality), and about computer use in a broader sense. And the idea for this study was born.

New Bitnet Users

During the pursuit of this study, I have come into contact in one way or another with many new users of bitnet, but there have been few who were near enough, geographically, to interview in a face-to-face mode, and I wanted to interview individuals in their own environments where possible. While I had proposed six interviews with an equal number of men and women, one man dropped out of the study for reasons unrelated to the study,and one woman was located who proved to be particularly articulate about the meaning of e-mail for herself and her colleagues replaced him, so the sample ended up being comprised of four women and two men.

The first question I invariably asked was "How do you use bitnet?" The answer to that question can be drawn along a continuum, from "for short business only" to "mostly personal",

with intermediate points on the continuum reading "business and a network", "business, one or more networks, and occasionally personal", to "many networks, some business, and a large amount of personal, collegial communication". Each individual used the e- mail system differently, with the most aversive noting that he has "sent messages to people and [he has] read messages, period, from individuals, and sometimes groups. But [he says] I'm not in, I don't read bulletin boards; I'm probably at the bare minimum of bitnet users". At the other end of the continuum is a woman who says:

> I still write letters when I have serious substantive work work to be done, such as journal reviews,communication about my own scholarly work, books, so forth. But now, I use bitnet to keep up with friends who are also colleagues who are very distant from my physically -- mostly good friends from graduate school days, and the early days of my national association, when a bunch of us were new. [But] I also communicate with people on this campus, friends, when I don't have time to talk on the phone. We have quite a large network on this campus. But mostly personal, I guess...

Between those two individuals is a woman who participates in, or listens in on, a half dozen major communications networks or electronic bulletin boards, all but one of which bear a relationship to her work (in information sciences), but who also uses the e-mail to network among other individuals, mostly women, across the country and in Canada, Great Britain and Australia.

At some point, I became curious about <u>where</u> people engaged in e-mail communication. For several, it was only at work; for others, it was a combination of at work and at home, where they were connected by modems to the larger university system. For another, it was anywhere, as he traveled with a laptop with modem capabilities, and frequently signed on to retrieve e-mail messages when he was traveling professionally. One woman in particular, because she was managing small children at home, had assigned her professional work -- writing, research, most reading, and all e-mail and network work -- to the office only, separating time with her children from time with her work.

Two of the men, however, logged onto bitnet only at home, with one explaining that to do otherwise was a waste:

> I do it at home. I don't like doing it at work, because it means that I'm logging on for the sole reason to get a bitnet message, which I may not have....Consequently, when I log onto bitnet, which is a long answer to your question, I long on when I get up in the morning, have breakfast. I have my cup of coffee. I go into the computer room and long onto bitnet. I do that to get it out of the way and that takes five minutes and then I'm into my work....I don't want to spend a half an hour doing this....I should also say that I don't like bitnet particularly because of my anal retentive nature.

The other man, and none of the women, were quite as negative as this man was about what bitnet could or would do for them. The other man, who carried major professional responsibilities, thought that

> ...this saves me a lot of time, and a good bit of secretarial help. I now do my own letters mostly anyway, and instead of letters to [colleagues about professional matters], I bitnet them. It helps to encourage them to bitnet me back. I don't use University letterhead. I make up my own, which always has my FAX number and my bitnet number on it, so they have it right there if they want it.

The habit of making up one's own letterhead appears to be prevalent among the new generation of computer users. For those with access to laser printers and variations in type, making one's own letterhead, personalized with home FAX numbers and bitnet addresses, appears to be common. Another increasingly common phenomenon relating to the electronic mail users community is the inclusion of one's bitnet access number on the business card, and several of these six individuals now have both their FAXes and their access codes listed along with addresses and departmental phone numbers.

All of the individuals commented in one way or another about an interesting phenomenon of "getting started" on bitnet, which I had noticed also. It is harder to make contact, initially, by bitnet, since having a bitnet number is a bit like having an unlisted phone number. The access code is not always readily available, and sometimes, even people with their own bitnet codes don't always remember theirs, or use them often, and so cannot readily recall them to give them

out. This is one disadvantage of the system; you cannot phone your AT&T operator and obtain a given institution's bitnet, let alone be connected with that person via e-mail. Thus, obtaining access by bitnet is a bit like creating a special relationship with a famous person; it may be awhile before you get access to what is essentially an "unlisted number".

On the other hand, as several pointed out, once you get access to an individual's number, you have virtually unlimited access, since your ability to send messages is not constrained by the willingness of the party to either receive them or to answer them or pick them up at a prespecified time.

Every single individual I interviewed commented on the fact that a piece of work which might have assumed a secondary place in the hierarchy of work could now be moved into a priority place, simply because attending to that piece of work might now no longer depend on connecting with another individual by telephone. The ease with which messages are left for colleagues -- to be picked up at the leisure of the colleague -- meant for all these individuals that they were not tied to "phone tag", the great game of trying, re-trying, and missing returned phone calls. The facilitative aspects of bitnet were not lost on any of the bitnet users, no matter how much they might dislike the medium (as one individual appeared to).

This is a form of "communication take-out", or messages in the fast food/fast talk lane. My respondents and I had moved swiftly (within several weeks of acquiring the technology) to a mode of dropping off messages when we were "hungry" for communication -- whether business or personal -- and picking up the same kind of "take out" messages when we got a few spare minutes, got a moment free, or wanted to check for responses. The system has great parallels to take-out food: when one is too busy to write letters, then e-mail is a quick and convenient way to nourish the worklife. For several of the women and both of the men, e-mail also served as a kind of "placeholder": it allowed communicants to keep each other informed about the status of various pieces of ongoing work in which they were involved. In short, it serves for some the same function as the telephone, without the necessity of phone tag, or leaving extended messages with secretaries or research assistants.

Networks

All but one of these respondents was in at least one "network", electronic bulletin board, or disciplinary list; several were in several. None of these current lists were anything but professionally related, although one of the women had been on a "blue line" -- an electronic bulletin board of individuals (nameless, or with CB-like handles) who wished to share sexual fantasies. In every case except for a feminist network to which several individuals belonged, the networks involved or were centered upon substantive research interests related to the individual's own scholarly work and current position. For a librarian, for instance, several of the networks were networks about networks -- networks related to information sciences, to the processes of networking, and to communication technologies as yet only envisioned. The largest number of networks, bulletin boards or scholarly conversation groups to which any individual belonged was six; the smallest, represented by one individual, none. Four of the respondents belonged to 1-3 networks. Five "chatted" on their networks regularly, although that might be only once a month, and one belonged to one network where she was completely silent and never chatted, but read the messages faithfully in the hopes of opening up new learning and perhaps a new line of scholarly inquiry for herself.

I pressed the male who was not on any networks hard as to why he was not, since he was an active scholar, and found echoes of "techno-aversion" which is often attributed largely to women (Turkle, 1988; Rothschild, 1983, pp. vii-viii):

> One...I am extremely busy and to get any more input is not something that I look forward to as a positive note at this point....The other quite frankly is technology that I cannot stand learning. It has taken me long enough to figure out how to send and receive mail: and unlike some individuals, I do not think it's fun to learn things like that. I find it quite annoying.

The irksomeness of the e-mail system was not noted by any other individual, male or female, to whom I spoke. All of the others found the technologies well worth mastering for the kinds of tasks which they could accomplish, and while several felt extremely comfortable with electronic mail, and others felt slightly less comfortable, none felt a sense of annoyance (at least not about

the technology; several felt a sense of frustration regarding how often their campus e-mail systems were "down", and they were prevented from either sending or receiving mail).

I pursued the question of what members of networks talked about, since my own network sometimes talks about itself-- about who we are and what kinds of things we do as people (taking our children to soccer games, having mothers-in-law in, how we should "converse" with each other to maintain maximum courtesy, given that we have no facial or paralinguistic cues to aid us in comprehending irony, sarcasm, or special forms of self-deprecating humor, what it means to be a community, and the like). Others had had similar experiences (none of my respondents was on my network, nor I on any of theirs). Their substantive specialty groups had veered off-course from the research substance to consider themselves culturally, and to query the possibility of whether or not they fit the anthropological and ethnographic definition of a "community". Furthermore, half of my respondents noted that at some time in the 12-18 months they had been using bitnet, one or more of their networks talked about what comprised "courtesy" and fair intellectual exchange, on the network.

This self-consciousness of the part of networks has been noted by others (Bregenzer, in progress; Qualitative Research Network, 1991), and the question of whether or not a genuine, anthropologically-understood and -grounded community can exist in cyberspace is a topic of great interest and concern to individuals spanning many disciplines.

About half of my respondents used electronic hookups for other university-provided services besides bitnet. All were connected to their local (or systemwide) university libraries by such programs as NOTIS, all had access to one or more data bases, including the partial catalogue of the Library of Congress, and several could access local data base resources in their states from their office computers, or at home, via modem. But half did not use these additional services, concentrating their overall computer time on just bitnet, word processing, and data processing (SPSS packages and the like). Several commented that they still sent graduate students to search out volumes from the library, or gave graduate students parameters within which searches should be conducted and let graduate students manage computerized literature

searches. This suggests, at least in some preliminary way, that access to both word processing and bitnet capabilities does not automatically mean interest in, or high use of, other information services and technologies.

Who's calling, please?

I was extremely interested in the question of who was talking to whom. Since every respondent gauged that s/he was on bitnet every day they were in the office (and some at home), the question of who is getting all those messages, and who those messages are coming from, is important to the idea of invisible colleges, to scholarly networks, and to the idea of "academic exchange and collaboration" (Wilson, 1992).

As I reported before, all individuals reported a mixture of contacts, personal and professional, and often, those were the same individuals. Nearly all noted that they shared information, knowledge, and resources -- primarily about upcoming conferences, upcoming electronic exchanges, and new books and articles. They sometimes talked about work, and some said they exchanged commentary with close colleagues about conferences from which they'd just returned. This latter kind of commentary was often either professional, as in who was leaving what institution, and where a position might be opening up, or intensely personal, as in what one woman called "pure gossip" (about other conference attendees).

But a most interesting set of responses came when I altered the question slightly in the interviews, and asked not only the original question -- "How do you use bitnet?" -- but also the question, "What difference do you think bitnet has made in your life as a scholar?" As it turned out, both questions were critical to this study. The former question elicited ruminations about the kinds and amounts of communications which went on in their individual work lives. The latter question elicited, after long thoughtful pauses, notions about the impacts of e-mail on their careers. One junior, untenured faculty member, swift to answer, had clearly thought about this, because she answered without hesitation:

> This has allowed me to create a space for myself in the field. Now, we don't have a large field, not like history, or English. But nevertheless, there are senior people out there, and a decade ago, I would have been very reluctant to approach these people with

> my ideas. But we're on a network together, and everybody trades bitnet numbers anyway, and I don't have to chase them down at a conference. We just get into a network discussion, and I insert my ideas into the conversation, and they respond to them. As a result, in four years, I've been able to establish myself as a serious scholar, with serious ideas, and people "listen" to me when I make a comment on something....
>
> As a result, I don't feel "junior" in this business. I have a voice. I have a scholarly identity....And I haven't had to spend years and years and years like junior scholars in the old days did, trying to get my work noticed. It's short-circuited that process by a factor of years. Maybe for all, or at least, many, of us....

Other women echoed this same sentiment: that their ideas were into their field quickly, and that they felt they had acquired a professional "voice", that they had an equal opportunity to be heard in the ongoing disciplinary "conversation" to which they were attached.

More importantly to several of the women, they were being contacted by the more senior scholars in return, either via network/bulletin board, or privately, to talk about their ideas. This phenomenon is not peculiar to the individuals I interviewed. Joyce (in Wilson, 1992, p.A17) noted that "this method of communication has democratized scholarship. 'It is not unusual to find yourself exchanging mail with someone who's a Nobel laureate or who's a very famous author....An idea you placed up on a list enters the culture in a way that probably hasn't been available since the 18th century'." A part of this "democratization" of scholarship has meant that women have acquired the means -- if they put aside their fears of technology, and if their university makes certain that the technology is available to everyone -- to exercise "voice" in the wider academic community in a way they have not experienced previously. The democratization means not only a wider and swifter audience, but also a dual-gendered and polyvocal one.

All but one of the individuals used bitnet for scholarly exchanges. The nature of those exchanges, however, is vastly different from those considered by Price, Crane and others who have studied invisible colleges, at least in part. Rather than centering around a critical paper, or journal article, the exchanges involved ongoing "conversations" about theoretical, substantive, and experimental ideas. While electronic journals do exist, and whild scholarly papers can be downloaded on (or created on) e-mail networks, rarely are the transmissions that long. Rather,

one scholar will pose a problem, and multiple individuals on the same network will respond, elaborate, extend, question, "interrupt" (in the critical theorists' sense), augment or provide more contemporary comment upon both the question and the responses of others. In this sense, bitnet provides a within-hours or within-days, hermeneutic circle. The circle organizes itself to perform both dialectic (critical, conflict-oriented) and dialogic (empathetic exchange) functions. Rarely ever does any single voice dominate the conversation, no matter how senior the scholar, and the contributions of junior and senior colleagues alike are weighed equally. Participants on these networks comment on their inherent democracy, and on the opportunities they create for gaining "voice".

But their important characteristic from the standpoint of invisible college is the brevity of the exchanges. While some exchanges will represent several pages of downloaded, printed copy, nevertheless/most exchanges tend to be very much shorter than old formats for exchange, which tended to be papers, journal articles, and/or letters. One long-term effect of this, several hypothesized, was that ideas which were fully developed might need to be regareded as community ideas, or group ideas. The old model of the "Lone Ranger" researcher, developing ideas by her/himself, or at most, with a colleague, may give way to group-developed and refiend scholarly ideas. Most certainly, the idea of having the boundaries and focus of problems being determined by a small nexus or node of researchers in a given field will probably give way to having more voices and a larger range of expertise feed into problem formulation.

Talk styles

Four of the interviewees knew about, understood, and tutored me in the differences between "talk-write" and "read-write". "Read-write" is standard journal and conference presentation discourse, primary, modal communication throughout the social sciences, although experimental, or "messy", texts are breaking both the mold and the hold of academic discourse (Marcus and Fischer, 1986; Van Maanen, 1988). "Talk-write" is the more usual form of scholarly discourse on e-mail.

Prior to the advent of interactive electronic communications, the four most common forms of communication in the academic world were scholarly papers (in a particularly strict form of discourse); collegial correspondence; phone conversations, many of which occurred in academic discourse format, since they dealt with formal institutional and disciplinary topics -- scholarly work, promotion, tenure and hiring decisions, administrative matters, and the like; and face-to-face (F2F) interactions. The latter are often quite informal, especially between research collaborators, good collegues and departmental fellows. With the widespread advent of electronic networks, however, newer forms of communication have now surfaced, and distinct lines are being drawn between "read-write", or writing for public consumption, and "talk-write", the conversational forms often used between network users, even though network "talk" is written communication. "Talk-write" is keyboard production of conversational style, characterized by brevity, wit whenever and wherever possible, incomplete sentences, deliberate grammatical misconstructions (where they will not be misunderstood), the use of keyboard diacritical symbols to indicate mood (for instance, " :) ", which is read sideways, is a "happy face", while " :(" is a sad one), and other forms of word and expressive usage which would be considered wholly inappropriate for more formal scholarly communication or discourse.

What is interesting about read-write versus talk-write is that scholars make deliberate choices to pursue one or other other styles, formally forgoing the more "cooled-out, stripped-down" style of conventional scientific and academic discourse. A new informality has arisen, probably intellectually akin to the need for additional expressiveness represented by experimental or "messy" texts, but we have no idea of what the long-range impact will be on more formal academic discourse.

Images of the Self

As I mastered the technology my self-image began to change. As a result, I wondered about the self-images of others who might be new users in the system. I made some highly gendered discoveries. Neither of the men, but all of the women, talked about the power they felt in mastering the system, in sending their first messages, in first beginning to find "mail" in their

electronic mailboxes. One woman said she was "utterly unafraid" of this technology, since her family was rather technology oriented; another was unafraid of the technology because her field was information sciences, and she had had graduate work in information technologies, although no access to e-mail or electronic networks until she came to her first professional position after her terminal degree.

The men appeared to view the technology as an instrumental acquisition, allowing them to communicate faster, and organize their work days more efficiently. The women, however, often expressed feelings which were less tool oriented, and more transformatively oriented. The men used phrases like "useful", "helps me to be more efficient", "get things done fast", "big improvement for the faculty", and "allows me to work at home but stay in touch", but women used other kinds of phrases. Female users, while not missing the utility of the technology, talked in terms like "expands my universe beyond this campus", "makes connection points in a lot of places, not just the U.S.", "has created the global village, at least among academics", and "makes me feel as though I'm able to be in many parts of the world". Women used words like "communication", "connection", "linkages", "reaching out", and "changed me". Women seem to understand the instrumental usage of electronic linkages, but they resonate to the expressive usages. And while the men tried to put time and space limits on their usage and talked about "efficiency", women talked about the pleasures and temptations of wanting to spend hours "connecting", and about having to discipline themselves to relatively more instrumental usages. One woman spoke about being able to spend two hours every day communicating with people, if she didn't have "serious writing" to be done. Both men and women understood the immediacy and snare of the possibility of connections, but women felt the need to be snared, to communicate, seemingly more viscerally than men, and had to discipline themselves to periods of "read-write" work moreso than men seemingly did. My hypothesis, tested out on later respondents, was that women were reacting positively to the connectedness the networks provided them. Several women affirmed this feeling. E-mail seems to be providing women the abilities to network that have been only inadequately realized in traditional academic forums:

campus groups and disciplinary and professional associations. Whatever the level of involvement in professional associations, with many of their women's caucuses, women felt additional, and very powerful, senses of connectedness with e-mail.

In addition to their own heightened senses of self and of power and connectedness, nearly all the women felt some sorrow for women who were not connected on their campus (where the campus had made no effort to get faculty hooked up), or who were themselves not interested in utilizing electronic networks. Coupled with this sense of near-pity was a sense of being at the leading edge of their disciplines, a form of status and class awareness. One mentioned the "lost opportunity" of connecting with other women.

Alterations in Scholarly Networks

One of the questions which drove this preliminary study was the issue of invisible colleges. The most well-known work in this area, that of Diana Crane (1972), was prompted by an earlier description provided by Price (1961), who observed about "invisible colleges" that:

> The basic phenomenon seems to be that in each of the more actively pursued and highly competitive specialties in the sciences there seems to exist an 'ingroup'. The people in such a group claim to be reasonably in touch with everyone else who is contributing materially to research in this subject, not merely on a national scale, but usually including all other countries in which that specialty is strong. The body of people meet in select conferences (usually held in rather pleasant places), they commute between one centre and another, and they circulate preprints and reprints to each other and they collaborate in research. Since they constitute a power group of everybody who is really somebody in a field, they might at the local and national level actually control personal prestige and the fate of new scientific ideas, and intentionally or unintentionally they may decide the general strategy of attack in an area (1961, p. 99).

But Blaise Cronin (1982) cautions that "It is clear from even a brief study of the literature that the concept is grasped in different ways, and the terminology associated with it variable" (p. 212). And it could be argued that in the field of higher education, a somewhat looser understanding of the term prevails. Typically, it is used to denote not just the leading edge, or "most hard pressed sections of the scholarly research front" (Ibid., p. 212), but more broadly, that group of individuals and colleagues with whom any scholar conducts regular communication

and/or collaboration, whether or not the scholar might be deemed by the discipline as a whole to be on the cutting edge, and whether or not in the hard sciences. In the discipline of higher education, we have often tended to use the word loosely to mean that group of individuals working in roughly the same area of research, and to whom one relates, whether because they are simply interested audiences for our research, or, at the other end of the continuum, they are our collaborators on one or several scholarly projects.

I asked each of the individuals whom I interviewed whether or not they had experienced alterations in their communication patterns with other scholars. Some interviewees were familiar with the idea of an invisible college, others were not. But three of the women and one of the men said that they had noticed that there were some scholars with whom they communicated less often now, and others with whom they communicated more often, directly as a result of e-mail access.

Some scholars have access to bitnet technology, but will not use it (either because they do not understand what the system will do, or because they feel such technology is not comfortable for them or congenial to their workstyles). Others still do not have access on their campuses, or in their departments. As a result, some scholars interested in the rapid exchange of ideas gradually communicate less with those for whom only a letter or telephone call is available. What some of these interviewees are describing in terms of the metamorphosis of their invisible colleges may be represented by the following diagram, which represents at present merely a small shift in the collegial network:

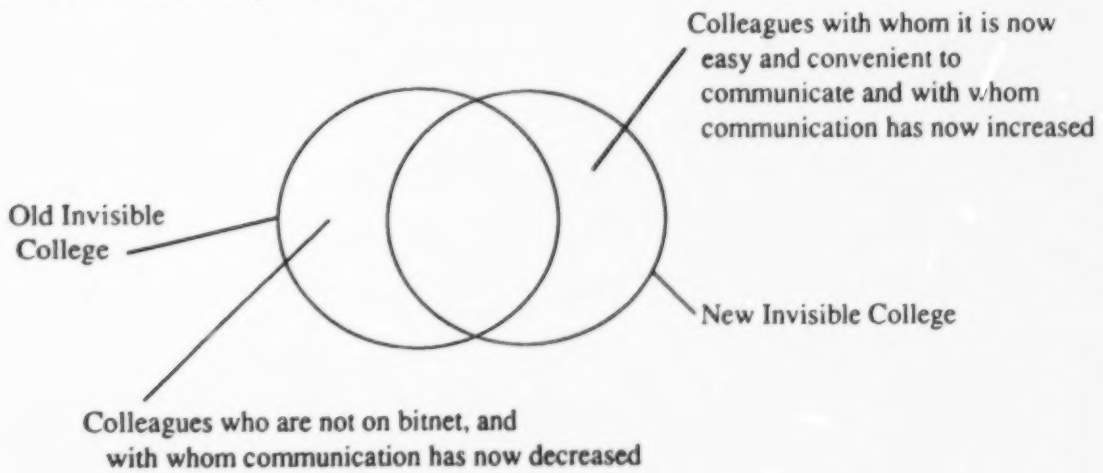
Colleagues with whom it is now easy and convenient to communicate and with whom communication has now increased
Old Invisible College
New Invisible College
Colleagues who are not on bitnet, and with whom communication has now decreased

Figure 1: Alterations in Communication Patterns Among Faculty

It is unclear whether this small shift will widen or close, as the e-mail technology becomes more widely available. No doubt, some scholars will always find it uncongenial or aversive, while others, even older scholars, will find it more, not less, congenial to their work. The most recent work on invisible colleges (Crane, 1972; Gaston, 1972; Crawford, 1971) suggests that invisible colleges coalesce around a "core" or key group of individuals who attract large numbers of communications, and who are themselves highly productive and highly communicative. It may well be the case that to refuse to utilize electronic networks will, over time, separate scholars from all or part of their invisible colleges, isolating them from the larger disciplinary and theoretical currents in scholarly arenas. Whatever the case, those on e-mail networks have found some tendency to fall behind in communicating with those who cannot be reached via e-mail.

While some colleagues may be, in this era of transition, uncertain as to whether or not they wish to live in an electronic village, still others embrace the idea. So while my respondents found that some of their former colleagues appeared to be harder to communicate with (a relative idea, since they still have the mail and the telephone at their disposal), new colleagues seem to be plentiful. As a colleague of mine who did not participate as a respondent put it, "If you haven't got bitnet, you got nothin'!"

Indeed, it does seem to be a blessing for scholars who tire of "phone-tag", but who find the "bucket brigade" (a metaphor for the distribution of e-mail) easy, cheap, convenient, and rich in possibilities.

The utility of invisible colleges has never been in doubt among scholars who study the phenomenon of technology transfer, the communication of scientific knowledge, or the internal structure of scientific communities (Cronin, 1982). Indeed, their care and feeding has been addressed by several works, and Parker (cited in Cronin, 1982, p. 228) urged that in order to "maximize the benefits provided" by these groups, that

> professional societies, employers and relevant government agencies concerned with increasing research productivity should concern themselves more with the facilitation of interpersonal contact among researchers.

The electronic mail system is a relatively inexpensive way to provide that interpersonal contact. Wilson argues that "[electronic mail] has fundamentally changed the nature of collaboration by allowing its users to work together as if they were in neighboring offices when in fact they may be a continent away" (1992, p. A17). Several hundred thousand e-mail communications (of whatever length) may be transmitted for the price of one roundtrip bi-coastal airline ticket. Thus, the very real question emerges as to whether or not e-mail can and will create a "community" in cyberspace. The possibility seems closer and closer, if it does not already exist.

Electronic Futures

I asked everyone I interviewed about what kinds of new possibilities they foresaw with electronic technologies. Some were too new to the system to have mastered even what they already had available, and wailed, "I can't even get on top of this! I can't begin to contemplate any more possibilities..." But others, already talking with electronic colleagues, were thinking about electronic conferences, journals available only through electronic means (and indeed, there are several already), about the possibility of support groups for individuals going through the promotion and tenure process, and other possibilities. Others believe that technological refinements will make additional improvements to the international e-mail system and create new flexibility, including the transmission of images, sound and moving pictures (Wilson, 1992).

The Work of Scholars and the Uses of Virtual Community

All of this work is extremely preliminary, although multiple scholars, often driven by their own experiential base and research curiosities, are exploring the changes which are taking place. When a technological advance promises (or threatens) to alter profoundly and unpredictably the way in which faculty conduct research and create scholarly communities and even see themselves as professionals, it is well worth the effort to discover what meanings they attach to these changes. Since the interview process can prompt individuals to make explicit to themselves knowledge and understandings which previously remained tacit, encouraging faculty

to think propositionally about the changes which are occurring in their work lives is useful and productive in creating a reflective stance on the impacts of technology introduction. But additionally, when technological frontiers intersect social and cultural frontiers (i.e., the transition from modernist narratives to postmodern constructions of culture and sub-culture), changes are often institutionalized before the significance of those changes can be documented, understood, mediated, softened, or incorporated without serious social disruption.

We are probably witnessing such an institutionalization process, with virtually no descriptive research to guide us in formulating policy. The technology is driving the alterations, rather than having an analysis of faculty needs dictate appropriate technologies. But lest this be considered a criticism, please note that the benefits which accrue to the larger society by having the knowledge-production segment in swift communication probably outweigh any social decrements which could be proposed. While other segments of society might be undergoing stress as a result of high technology (Brod, 1984), most of the academic community is predisposed to be quite comfortable with e-mail and data base access. I found little evidence of stress related to the introduction of the technology, although I did find faculty coping with enormous frustration surrounding the "software" access, the actual commands used to access the programs.

We probably ought to revisit the issue of invisible colleges: how they are formed, how their social construction processes will change as a result of electronic communications, whether the "democratization" of such communications will effectively flatten out the old elite hierarchies which invisible colleges used to signify, how the electronic medium will alter citation patterns (the old database for the original invisible college studies).

I also found that most of my interviewees were possessed of strong new senses of self--as active learners, as members of the "bucket brigade", as explorers and adventurers, and as effective and quasi-efficient double-loop "hackers", trying new codes by themselves, and trying to "crack" program logics without tutors. We could extend the pioneering work of Turkle and

others to explore how the "self" is reconfigured in the encounter with "the intimate machine" (Turkle, 1988).

These respondents were, in some cases, just beginning to move from a relatively new understanding of dialogue (in a critical sense), to the idea of "multi-logue": many-voiced but anonymous contributions to the development of ideas. This intellectual realization has led some to uneasiness regarding the idea of intellectual property, ownership of ideas, and traditional concepts of copyright. Research could be directed toward the very real and extremely immediate problem of copyright and intellectual property rights. Electronic communication does nothing less than alter the model for communication last altered with the introduction of the Gutenberg press.

We will have to reconsider what we believe to be academic, or learning, or research, or knowledge production, communities. Van Maanen (1988) proposes that the work of Iser and Fish in reader response theory may come to be important (for other reasons, however), because it presupposes an "interpretive community", a loosely coupled group wherein "the meaning of a given object [say, a text] only emerges from the interaction of the symbolic properties of that object and the cognitive categories of those who experience the object" (p.41). If the object is a conversation via "talk-write", we can begin to anticipate some of the possibilities for new definitions of community to arise. The idea of communities in cyberspace is already being discussed, and while some anthropologists are probably rolling in their graves at the way the term community is being used, nevertheless those who see themselves as a part of a community will probably have the last say as to whether it is one.

Individuals who do research with women, and feminist scholars, have already begun to explore the effects of technology on women, and no doubt will continue to pursue this topic. We need more descriptive empirical work on the empowering or disempowering effects of e-mail on academic women, and on the facilitation or prevention of their achieving "voice" within institutions and disciplines. This preliminary piece of work demonstrates that women feel they are empowered by this technology, but they may be experiential outliers. At institutions which

do not encourage the use of e-mail, or where women may feel some "technophobia", the technology may act indirectly to disempower. Until many more cases are compiled, we will not know, nor will we know how to effect achange.

Epilogue

Like most interesting studies, this one raised more questions than it answered. And like most ethnographically-oriented and qualitative studies, there was more data than could be put to use in one paper, and several different ways of entering a discussion about the data. Research communities may be in the process of being restructured by electronic communications. Some faculty who are hard-wired refuse to use this form of communication. Others not yet linked up desire to be. And still other have -- with pleasure or trepidation or both -- joined the electronic community. The joining of invisible colleges with virtual reality portends a reconfiguration of how faculty can and will work in the near and far future. These portents suggest that we begin collecting descriptive data now on how and under what circumstances faculty have found and now believe their work lives will be affected.

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